

Medical Science

To Cite:

Kropidłowska D, Bochyński C, Góralski P. Rosacea-current information on diagnosis and treatment: A literature review. *Medical Science* 2024; 28: e152ms3478
doi: <https://doi.org/10.54905/dissci.v28i154.e152ms3478>

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Peer-Review History

Received: 03 September 2024

Reviewed & Revised: 07/September/2024 to 13/December/2024

Accepted: 17 December 2024

Published: 21 December 2024

Peer-review Method

External peer-review was done through double-blind method.

Medical Science

pISSN 2321-7359; eISSN 2321-7367



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Rosacea-current information on diagnosis and treatment: A literature review

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ABSTRACT

Introduction: Rosacea is a common and chronic inflammatory dermatosis. It occurs with increased frequency among adults of northern European descent with a fair complexion. A prominent role in the formation of skin lesions is attributed to a disturbed immune response and abnormal processes in the skin's vascular system. Treatment is complicated and lengthy. **The aim:** This publication aims to review the literature on current information on the diagnosis and treatment of rosacea. **Results:** Rosacea is a disease with a diverse course and etiology. In treatment, it is crucial to recognize the exact subtype of the disease (erythematous-telangiectatic, papulopustular, fimatoid, or ocular) and to identify exacerbating factors. **Conclusions:** Topical treatment, used as monotherapy or as part of combination therapy, is the first-line treatment is effective in patients with mild to severe rosacea.

keywords: Rosacea, treatment, diagnosis, rosacea pathogenesis

1. INTRODUCTION

Rosacea is a common inflammatory disease that mainly affects the mid-face area of the skin (Van-Zuuren, 2017; Van-Zuuren et al., 2019; Van-Zuuren et al., 2021). It occurs predominantly in fair-skinned individuals (phenotype I and II by Fitzpatrick) living in northern Europe (Van-Zuuren et al., 2021; Ahn and Huang, 2018; Gallo et al., 2018; Alexis et al., 2019). The literature describes that women are more likely to struggle with rosacea, while severe forms involving hypertrophy - rhinophyma are found mainly in men. The peak incidence is 30-50 years of age, and the condition can occur at any age (Van-Zuuren et al., 2021; Gether et al., 2018).

The incidence of rosacea is 1-10% of the population (Placek and Wolska, 2016; Gether et al., 2018). The etiopathogenesis of rosacea is not fully explained, and it is influenced by many factors. Immunological phenomena, and vasomotor disorders, are attributed to a significant role in the formation of characteristic lesions (Ahn and Huang, 2018; Gallo et al., 2018; Tan et al., 2017). Genetic factors,

environmental factors, gastrointestinal disorders, endocrine disorders, or skin infections influence the development of rosacea (Van-Zuuren et al., 2021; Barakji et al., 2022). Seborrheic dermatitis or a history of acute juvenile acne increases the risk of the disease.

The course of the condition is chronic, with periods of exacerbations and remissions (Ahn and Huang, 2018). Although over time there have been advances in the understanding of the pathomechanism of rosacea development, treatment methods have been improved, the condition still poses diagnostic as well as therapeutic challenges (Ahn and Huang, 2018; Gallo et al., 2018; Tan et al., 2017). In our publication, we will focus on presenting current information on the diagnosis and treatment of rosacea.

2. REVIEW METHODS

This review was conducted by searching for current papers on PubMed and Google Scholar using the search phrases (rosacea) AND (treatment) AND (diagnosis) AND (rosacea pathogenesis). After eliminating duplicates, we appraised all publications using the titles and abstracts. Studies that have made a significant contribution to science were included in the review. Following an exact revision of complete manuscripts, 30 articles met the inclusion criteria.

3. RESULTS AND DISCUSSION

Clinical manifestations

There are four main subtypes of rosacea (Table 1):

- Ocular variant
- Maculopapular variant
- Erythematous with telangiectasias variant
- Hypertrophic variant

It should also be mentioned that there is another subtype that comes from the group of granulomatous diseases of the face - the granulomatous variant. The division into the subtypes mentioned above, was established based on differences in clinical symptoms (Tan et al., 2017). The ocular form is quite challenging to diagnose, as ophthalmic symptoms such as pruritus, dry eye, and recurrent Meibomian gland inflammation may be more common than skin lesions. The skin lesions are mainly located on the eyelid margins and include redness and telangiectasias (Rainer et al., 2017). The papulopustular form is a form of rosacea where the lesions locate on the central parts of the face (nose, cheeks).

The main changes in this form are classic for acne erythema, on which pustules and papules localize. These lesions give physical discomfort in the form of an intense burning sensation on the skin, which in most patients leads to scratching of these lesions, making the skin even more irritated and swollen (Gallo et al., 2018). Characteristic enlargement of small blood vessels against a background of erythema is a primary sign of the erythematous form with telangiectasias (Figure 1, Figure 2, Figure 3). The granulomatous form is where, in addition to the erythematous lesions typical of acne, papules (of various colors: brown or red) coexist on the skin, which can lead to scarring (Van-Zuuren, 2017).

Table 1 Classification of rosacea by the National Rosacea Society

	Subtypes of rosacea
1	Erythematous with telangiectasia
2	Papulopustular
3	Hypertrophic-infiltrative
4	Ocular
5	Granulomatous

Factors exacerbating the course of the disease

As rosacea is an inflammatory disease, there are many factors that exacerbate the disease. Stress was one of the most frequently mentioned factors by patients that exacerbated their symptoms. In second place is sun exposure. Ultraviolet radiation can aggravate inflammation, while high temperatures can lead to vasodilation and erythematous lesions. After intense exercise patient can observe exacerbation of skin lesions in very similar mechanism to exposure to high temperature. Further factors were diet and alcohol

consumption. Hot meals, hot drinks, and spicy condiments cause reddening of the facial skin and exacerbate the erythematous lesions (Geng et al., 2023).

Differentiation of the disease

In diagnosing rosacea, it is essential to differentiate with other skin diseases. The first condition the doctor must consider is acne vulgaris, which, despite several similarities to rosacea, is characterized by the absence of telangiectasias, the lack of involvement of the eye area, as well as the presence of blackheads and the possible descent of lesions from the face to the trunk (Gallo et al., 2018). Another disease where erythema often occurs is seborrhoeic dermatitis. During seborrhoeic dermatitis, the scalp can be affected, as well as the area around the nasolabial folds and the eyebrows and lips. The ocular form of rosacea should mainly be differentiated from allergic skin diseases - including atopic dermatitis. The changes are pretty similar - redness and dryness of the eyelid and significant itching. The lesions may also co-occur with the elbow flexure involvement and skin desquamation typical of atopic dermatitis (Alexis et al., 2019).

Diagnosis

The diagnosis has been based on the patient's medical history and the presence of skin symptoms typical of rosacea (Tan et al., 2017). Persistent erythema in the central part of the face is often the decisive element in making the correct diagnosis.

Treatment

Rosacea therapy is based on an individualized approach to treatment, taking into account the type and also the severity of the lesions (Steinhoff et al., 2016; Rainer et al., 2017; Thiboutot et al., 2020). Acne is a disease that makes the skin more sensitive to everyday products, including various types of cosmetics (Tan et al., 2017; Schaller et al., 2020). Depending on the advancement of the lesions, the following treatment methods are used (Schaller et al., 2017; Alexis et al., 2019; Walsh et al., 2018):

Basic rules- oriented to avoid provoking factors

Topical treatment- preparations containing metronidazole or antibiotics in the form of creams, solutions

Systemic treatment- antibiotics (tetracycline, erythromycin), retinoids, metronidazole at a dose of 250-500 mg/day, as well as vitamins: K, B2, B3, ascorbic acid

Surgical treatment- use for rhinophyma, CO2 laser, electric knife shearing

Due to the complex pathomechanism of the lesions and the massive role of the influence of environmental factors, therapy alone, which has been based on the use of active preparations, is not always able to provide complete satisfaction to the patient (Schaller et al., 2017; Buddenkotte and Steinhoff, 2018; Schaller et al., 2020).

Topical therapy

The effectiveness of metronidazole has been confirmed in numerous scientific studies over the years (Schaller et al., 2016). Azelaic acid has antibacterial and anti-inflammatory properties (Placek and Wolska, 2016; Buddenkotte and Steinhoff, 2018; Zhang et al., 2021). It has an inhibitory effect on melanogenesis, thus preventing or reducing the appearance of post-inflammatory hyperpigmentation. It also has a beneficial impact on seborrheic lesions. In treating rosacea, based on single studies, beneficial effects are attributed to 1% clindamycin combined with 5% benzoyl peroxide (Placek and Wolska, 2016).

Topical retinoids are not a primary treatment for rosacea because they are irritating to the skin. The exception is retinaldehyde, which causes less irritation and in some cases its action may prove beneficial in the treatment (Placek and Wolska, 2016). Ivermectin- a cream with 1% ivermectin, an anti-inflammatory drug, also has an anti-parasitic effect, including on Demodex (Placek and Wolska, 2016; Buddenkotte and Steinhoff, 2018; Aktaş-Karabay and Aksu-Çerman, 2020; Zhang et al., 2021).

UV radiation

Sunlight can affect rosacea. Therefore, it is crucial to use UV protection products (Schaller et al., 2017; Buddenkotte and Steinhoff, 2018; Alexis et al., 2019; Almeida et al., 2024).



Figure 1 Rosacea on the nose

* Source photo of our patient, taken from a private gallery, made by the authors at the clinic.

Treatment of erythematous symptoms

Facial massage with lymphatic drainage, facial massage is used, which is also combined with cosmetics for sensitive skin (Placek and Wolska, 2016). Sometimes, the therapy uses peel complexes of retinoic acid, azelaic acid, kojic acid, vitamin C and lactic acid. This provides anti-inflammatory, antibacterial and antioxidant effects. Retinoids give a lower tendency to erythema (Placek and Wolska, 2016). To prevent rosacea, cleansing with mandelic acid and glycolic acid is used, which are great for rebuilding the epidermal barrier (Alexis et al., 2019).



Figure 2 Rosacea on the nose

* Source photo of our patient, taken from a private gallery, made by the authors at the clinic.

Lasers

In the treatment of rosacea, using a non-ablative laser involves remodeling the connective tissue in the skin and improving the epidermal barrier. After 1 to 3 procedures, the best treatment results are achieved (Anzengruber et al., 2017; Buddenkotte and Steinhoff, 2018; Dursun et al., 2019; Steinhoff et al., 2016). Vascular lasers are the mainstay of therapy. These include lasers such as the pulsed-dye laser (585 or 595 nm) and diode laser (532nm). Lasers emitting longer wavelengths, such as the 810 nm diode laser, are used for patients whose vascular location is deeper (Placek and Wolska, 2016). Satisfactory results are also obtained after treatments with IPL (Cai et al., 2022; Zhang et al., 2021). In younger people and also with a more severe form of rosacea, light with 560 nm, energy of 12-16 J/cm², and pulse duration of 6-7 ms gives perfect results (Lim et al., 2014; Placek and Wolska, 2016).



Figure 3 Rosacea on the nose

* Source photo of our patient, taken from a private gallery, made by the authors at the clinic.

LED light

LED light, red 630 nm, is the primary light used in the treatment of rosacea, as it reduces inflammation and promotes healing with good effect.

Amber light, 590 nm yellow-orange, has a soothing effect.

For paroxysmal erythema, green light 530 nm is effective (Placek and Wolska, 2016).

General treatment

There are many methods of topical therapy, but a large proportion of patients with papulopustular rosacea require general treatment, at least periodically, when the disease is exacerbated. The drugs of choice are tetracyclines, which have anti-inflammatory and antichemotactic effects. Macrolides are also used (Placek and Wolska, 2016; Schaller et al., 2017; Schaller et al., 2020).

Treatment with surgery

For the treatment of patients with hypertrophic tissues on the nose (rhinophyma), treatments are applicable (Fink et al., 2018):

Surgical excision of full-thickness skin with flap reconstruction or skin grafting

Surgical excision of skin of incomplete thickness

Dermabrasion, thanks to abrasive devices, the upper and middle layers of skin are removed from the nasal bump

Electrocoagulation

Cryosurgery

Lasers, the most commonly used are either CO2 or erbium-yag laser

Diet in rosacea

Products that cause vasodilation include: spicy foods, spices, pepper, sauces, citrus, figs, bananas, cheese, chocolate, cream, soy sauce, meat marinades, legumes, coffee and drinks that contain caffeine, alcohol (Placek and Wolska, 2016; Buddenkotte and Steinhoff, 2018). Artificial sweeteners, especially aspartame, cause significant redness noticeable in up to 30% of patients. Efforts should be made to exclude products that are erythema stimulants. Foods such as blueberries, cherries, omega three acids, unsaturated fatty acids, foods rich in vitamin C, B2 found in green vegetables, dairy, and whole grains are beneficial in reducing erythema (Placek and Wolska, 2016; Buddenkotte and Steinhoff, 2018; Algarin et al., 2024).

Care in rosacea

Proper care is an essential part of rosacea therapy (Anzengruber et al., 2017; Geng et al., 2023). Care should include (Schaller et al., 2016; Almeida et al., 2024):

Proper moisturization of the skin

Gentle cleaning

Avoiding cosmetics that cause irritation

Take care of sun protection

The length of rosacea treatment is adjusted individually to the individual patient (Steinhoff et al., 2016; Delans et al., 2022; Ivanic et al., 2023). In cases where general treatment is necessary, the entire therapy should not be shorter than 12 weeks. Maintenance treatment is based on topical preparations, and appropriate care is recommended (Placek and Wolska, 2016; Almeida et al., 2024). Granulomatous and pustular rosacea very often require repeated re-introduction of general therapy.

4. CONCLUSIONS

The presented case highlights that individualized therapy is crucial in treating rosacea. The patient has been treated for 3 months using: metronidazole and ivermectin. Local treatment, both in monotherapy and as part of a combined regimen, is the first-line choice and is effective in patients with mild to severe rosacea. Cooperation with the patient is also essential in avoiding triggers such as UV radiation, stress, hot drinks, hot spices, or alcohol. This can help improve the quality of life and reduce the risk of disease relapses. Research aimed at better understanding the mechanisms of the disease may contribute to the development of even more effective treatment methods.

Author's contribution

Dominika Kropidłowska: Conceptualization, methodology, review and editing, formal analysis

Cezary Bochyński: Methodology, review and editing, visualization, data curation, investigation

Patryk Góralski: Conceptualization, investigation, resources, writing- rough preparation

Project administration: Patryk Góralski

Ethical approval

The ethical guidelines for Human Subjects are followed in the study.

Informed consent

Written & Oral informed consent was obtained from individual participants included in the study.

Funding

This study has not received any external funding.

Conflict of interest

The authors declare that there is no conflict of interests.

Data and materials availability

All data sets collected during this study are available upon reasonable request from the corresponding author.

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